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Effects of Different Energy Protein Ratio on the Performance of Desi Native Chickens During Growing Phase

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Abstract: An experiment was conducted to determine the effect of different energy protein ratio on the performance of desi chickens during growing phase (9-20 weeks), Six different experimental rations having 2700 and 2900 kcal kg^{-1} of Metabolizable Energy (ME) and with 14 and 16% Crude Protein (CP), for female birds and 2750 kcal kg^{-1} ME with 14 and 16% CP for male birds. Each experimental group of each the male and female chicks had 12 replications having 20 chicks each. At the end of experiment, non-significant difference ($p>0.05$) was noted among weight gain, feed intake and Feed Conversion Ratio (FCR) in both male and female chicks. The feed cost per kg weight gain for female chicks fed diet having 14% CP and 2700 kcal kg^{-1} ME was lowered ($p<0.01$) than those of other groups. However, non-significant difference was observed in the cost of feed per kg weight gain for male chicks fed experimental diets. The minimum cost per bird in female chicks was noticed in birds fed diet having 16% CP and 2700 kcal kg^{-1} ME. Based on the findings of the present study, it may be stated that higher energy and protein levels in the feed may not be significantly improved the growth performance of the desi chicks in growing phase. However, the lower levels of energy and protein in the desi chicks diet may be significantly lower the cost of desi chicks rearing during growing phase.

Key words: Desi chicken, crude protein, metabolizable energy, weight gain, feed intake

INTRODUCTION

In Pakistan, poultry production has been playing an important role in the supply of animal protein foods of high biological value for the human population growing at annual rate of about 2.1% per annum (Rehman and Bhatti, 2003). In the year 2004, 263.60 million commercial poultry (14.43 million layers, 245.85 million broilers and 3.32 million breeders) and 32.0 million rural poultry were maintained in Punjab (Anonymous, 2004-2005). During this period, the share of rural poultry in overall production of poultry products at the national level has been reported 61.55% eggs (5341 million) and 42.70% poultry meat (0.14 million metric tone). Rural poultry possesses bright prospects for future development in view of easy and abundant availability of all the requisite inputs such as land, labour and feed resources in rural areas and its lower cost of production compared to commercial poultry. This sector can help in enhancing household income and improvement of family health status through better nutrition.

The main cause of slow pace of development in rural poultry production sector is poor productive potential of native desi chickens (Bhatti *et al*., 1990). Desi is a non-descript chicken possessing slow growth rate, poor egg production and feed conversion efficiency, low egg size and broodiness (Bhatti and Sahota, 1996; Sahota and Bhatti, 2001). Efforts are needed to increase productive potential of desi rural chickens, which are known to possess century old adaptation to local

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rigorous environmental conditions and also better resistance to infections. The productive potentials of desi chickens might be improved through selection, cross breeding and improved nutrition (Ahmed and Hshnath, 1983; Bhatti and Sahota, 1994).

Performance of chicken greatly depends upon adequate supply of nutrients in the rations for getting economical and profitable eggs or meat. The farmer must take great care in formulating ration that fulfills all the nutrients requirements for growth or egg/meat production (Rao, 1989). El-Zuberi and Mohammad (1993) reported that diets contained 15% CP and 10 MJ kg^{-1} ME were given better results for optimal growth in laying pullets. Hussein *et al*. (1996) reported that feed intake and body weight gain was improved by increasing protein content, however, feed intake was decreased by increasing energy content in diets of growing pullets. Murakami *et al*. (1997) reported that increasing protein levels in Hyline pullet diets had a linear effect on intake of birds whereas, there was no effect on body weight at 16 weeks of age. Larry (1989) stated that proper nutrition is a key factor in determining performance and profits from highly developed strains of laying birds. It is very important to feed each strain of bird an optimum level of nutrients to allow them to express their genetic potential for both performance and profitability. Each strain of birds had different nutrient requirements at various stages of life depending upon growth and productive performance. Earlier work on improve productivity of rural chickens through selective inbreeding or cross-breeding has been documented (Sahota *et al*., 2003). However, very little research work has been made to study on nutritive requirements of native desi chickens under our local environmental conditions. Keeping this in view, the present project was undertaken to examine the effect of different energy protein ratio on the performance of desi native chickens during the growing phase and to work out its economics of rearing during this phase.

MATERIALS AND METHODS

Experimental Chicks

Three hundred and sixty (240 females and 120 males) desi chicks (first generation F_1) were randomly obtained from the poultry flock being maintained at Poultry Research Institute, Rawalpindi under the development scheme Selection and Breeding of Indigenous Poultry Breed in Punjab-2005. The female chicks were randomly divided into 4 experimental groups viz., F1, F2, F3 and F4, while, the male chicks were divided into 2 groups, M1 and M2. Each experimental group of each the male and female chicks was further sub-divided into three equal replicates having 20 chicks each. They were randomly assigned to 18 pens (each measuring 20×22.5 cm) and maintained on litter floor under optimum managemental conditions. Each bird was provided with 2.50 cm feeding and 1.90 cm watering space as recommended by North (1984). The birds were kept under darkness during the night and were only offered the day light. The experiment was conducted for a period of 12 weeks (9 to 20 weeks of age) during the months of April to June.

Experimental Diets

Six different experimental diets (4 for the female and 2 for the male chicks) were prepared, at Feed Mixing Plant of Nutrition Section of the Institute as per NRC standards (1994). The experimental diets for female chicks were containing two energy levels i.e., 2700 and 2900 kcal kg^{-1} ME, with either 14 or 16% CP. Similarly, the experimental diets for the male chicks were containing 2750 kcal kg^{-1} ME with either 14 or 16% CP. Each diet was analyzed for proximate composition and minerals as methods described by AOAC (2000) at feed testing laboratory of this institute. All analyses and determinations were done in triplicate. The chemical and nutrients composition of the experimental diets is given in Table 1. The birds were fed experimental diets *ad libitum*. They had access to clean and fresh drinking water at all the times.

Table 1: Composition (%) of experimental diets with different energy protein levels during growing phase

	Diets*					
Parameters	A	B	C	D	E	F
Maize	-	23.12	15.5	30.84	-	-
Rice broken	53	-	50	15	54	31.5
Wheat	-	25	-	18.2	1.6	21.32
Rice polishing	24	24	15	10	24	24
Cotton seed meal	4.16	6	-	5	3.96	6
Corn gluten meal 60%	-	1.42	-	1.5	-	0.25
Corn gluten meal 30%	3	3	1.6	1	1.75	3.0
Rape seed meal	6	6	6	6	6	6
Guar meal	-	3.5	-	-	-	-
Soybean meal	-	-	2	3.5	-	-
Fish meal	-	-	2.2	2.7	-	-
Molasses	5	4	3	3	4	4
Bone meal	2.3	1.75	2.2	1.64	2	2
Marble powder	1.8	1.474	1.8	1.06	1.55	1.22
Salt	0.05	0.15	0.1	0.1	0.15	0.086
Lysine	0.18	0.154	0.133	0.048	0.185	0.165
Methionine	0.13	0.097	0.12	0.065	0.13	0.15
Vitamin mineral premix	0.3	0.3	0.3	0.3	0.3	0.3
Choline chloride	0.04	0.04	0.04	0.04	0.04	0.04
Nutrients composition						
Metabolizable energy (kcal kg^{-1})	2700	2700	2900	2900	2750	2750
Crude protein (%)	14	16	14	16	14	16
Energy:Protein	193:1	169:1	207:1	181:1	196:1	171:1
Ether extract (%)	3.27	4.38	3.07	3.38	3.3	3.467
Crude fiber (%)	5.7	6.2	4.6	4.73	5.64	5.96
Calcium (%)	1.2	1.0	1.3	1.0	1.2	0.97
Phosphorus (%)	0.36	0.36	0.38	0.38	0.36	0.36
Lysine (%)	0.72	0.72	0.72	0.72	0.72	0.72
Methionine (%)	0.36	0.36	0.36	0.36	0.36	0.39

*A = Diet given to F1 group, B = Diet given to F2 group, C = Diet given to F3 group, D = Diet given to F4 group, E = Diet given to M1 group and F = Diet given to M2 group

Experimental Data

The data on weight gain, feed intake and mortality rate were recorded on weekly basis. Feed conversion ratio (feed consumed kg^{-1} gain) and economics of rearing desi chickens on different experimental diets were worked out. All data were determined by using the SPSS version 9.5 (SPSS, Cary, NC, USA) statistical analysis program, A p-value of <0.05 was considered a significant difference among groups and the comparison of means was made using Duncan's Multiple Range Test (Steel and Torrie, 1984).

RESULTS AND DISCUSSION

The results indicated that non-significant ($p>0.05$) difference was observed among average weight gain of all groups of female and male chicks (Table 2, 3). The maximum average weight gain was found in female chicks fed diet containing energy 2700 kcal kg^{-1} with 14% CP. Similarly, maximum average weight gain was found in male chicks fed diet having energy 2750 kcal kg^{-1} with 14% CP. A similar trend was noticed in feed intake and feed conversion ratio for both male and female chicks of all groups (Table 2, 3).

The results of the present study are in line to the findings of Fwu and Ali (1995), Murakami *et al*. (1997), Rosa *et al*. (1997), Yung *et al*. (2001) and Wu *et al*. (2005), who reported that non-significant ($p>0.05$) difference was observed in weight gain, feed consumption and FCR with increasing the protein and energy ratio in commercial breeder pullet diets at growing phase. The results of the present study are not in agreement with the findings of Rehman *et al*. (1989), El-Zuberi and

Mohammed (1993) and Hussein *et al*. (1996), who reported that White Leghorn chicks gained more ($p<0.05$) body weight when fed diets containing different energy protein levels. This difference might be due to the difference in breed or age (22 weeks) of the growing chicks.

A significant ($p<0.01$) difference was observed among the feed cost per kg weight gain for female chicks fed various diets (Table 2). The group A exhibited significant difference from all other three groups B, C and D which were non-significant ($p>0.05$) with respect to each other (Table 2). Group A has the minimum feed cost (Rs. = 69.900) per kg weight gain, whereas, group C has maximum (Rs. = 87.740) feed cost per kg weight gain. Similar findings are reported by Salas *et al*. (1998). However, non significant ($p<0.05$) difference was found in the cost of feed per kg weight gain for male chicks fed two diets (Table 3). The maximum cost per bird (Rs = 159.50) in male chicks was noted in group E whereas, minimum cost per bird (Rs = 158.97) in male chicks was in group F (Table 3). The detail regarding the cost of production of each group is shown in Table 4. The results of the present study are close to the findings of Yung *et al*. (2001), who reported that the diet containing 15% protein and 2800 kcal kg^{-1} ME was sufficient in maintaining normal growth and carcass performance in capons

Table 2: Growth performance feed intake, feed conversion efficiency and cost of production of female desi chickens fed different experimental diets

	Diets*			
Parameters	A	B	C	D
Mean body weight gain (kg)	0.648±0.030	0.563±0.028	0.567±0.026	0.590±0.030
Mean feed intake (kg)	5.109±0.115	5.168±0.110	5.006±0.110	5.130±0.098
Feed conversion efficiency kg^{-1} gain	7.889±0.005	9.288±0.003	8.890±0.005	8.718±0.001
Feed cost kg^{-1} gain (Rs.)	69.900^{a}	83.600^{b}	87.740^{b}	87.003^{b}
Average cost per bird (Rs.)	131.470	127.930	136.470	135.950
Mortality (%)	5.000	-	8.330	6.660

Means with different superscript in the rows indicate significant ($p<0.05$) difference. *: A = Diet given to F1 group, B = Diet given to F2 group, C = Diet given to F3 group and D = Diet given to F4 group

Table 3: Growth performance and cost of production of male desi chickens fed different experimental diets

	Diets*	
Parameters	E	F
Mean body weight gain (kg)	0.769±0.030	0.745±0.025
Mean feed intake (kg)	5.144±0.125	5.100±0.130
Feed conversion efficiency kg^{-1} gain	6.781±0.001	6.875±0.003
Average feed cost kg^{-1} gain (Rs.)	61.290	63.240
Cost per bird (Rs.)	159.500	158.970
Mortality (%)	13.330	18.330

Non-significant ($p<0.05$) difference, *: E = Diet given to M1 group, F = Diet given to M2 group

Table 4: Cost of production of desi pullets on different experimental diets

	Diets*					
Parameters	A	B	C	D	E	F
Avg. cost per bird (9 weeks old) (Rs.)	30/-	30/-	30/-	30/	30/-	30/-
Avg. cost of feed $bird^{-1}$ from 9-20 weeks of age @ Rs. 12 kg^{-1} feed	61.30	62.02	60.07	61.56	61.73	61.20
Cost of medicine vaccine^{-1} per bird from 9-20 weeks of age (Rs.)	10	10	10	10	10	10
Labour cost $bird^{-1}$ (one attendant @ Rs. 2000 pm^{-1} for 12 weeks)	16.66	16.66	16.66	16.66	16.66	16.66
Electricity gas^{-1} charges per bird (Rs.)	4.25	4.25	4.25	4.25	4.25	4.25
Miscellaneous charges (Rs.)	5/-	5/-	5/-	5/-	5/-	5/-
Mortality losses (Rs.)	6.26	-	10.49	8.48	17.01	21.46
Avg. cost $bird^{-1}$ (Rs.)	131.47	127.93	136.47	135.95	159.50	158.97

*: A = Diet given to F1 group, B = Diet given to F2 group, C = Diet given to F3 group, D = Diet given to F4 group, E = Diet given to M1 group and F = Diet given to M2 group

during the finishing period. The optimal marketing age was no more than 29 weeks of age for live-weight gain, feed conversion and feed per kg live-weight gain. In the present study, there was non significant difference in mortality percentage in both male and female chicks. The mortality range in female chicks was 5 to 8.33% whereas, it was 13.33 to 18.33% in male was found.

CONCLUSION

Higher energy and protein levels in the feed may not be significantly improved the growth performance of the native desi chicks in growth phase. However, the lower levels of energy and protein in the desi chicks diet may be significantly lower the cost of desi chicks rearing during growing phase.

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